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MANAGEMENT GAMING AND ITS APPLICABILITY AT THE UNITED STATES NAVAL POSTGRADUATE SCHOOL

JOHN H. BLACKFORD

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John H. Blackford

MANAGEMENT GAMING AND ITS APPLICABILITY AT THE UNITED STATES NAVAL POSTGRADUATE SCHOOL

by

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Lieutenant, Supply Corps
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Submitted in partial fulfillment of
the requirements for the degree of

MASTER OF SCIENCE
IN
MANAGEMENT/DATA PROCESSING

United States Naval Postgraduate School
Monterey, California

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ABSTRACT

Management gaming is a new technique for teaching management principles. The applicability of the technique in the Management Curriculum at the United States Naval Postgraduate School is analyzed against the background of the history of management education in general and an analysis of other techniques in particular.

The writer wishes to express his appreciation for the assistance and constructive criticisms given him by Professor Cowie of the United States Naval Postgraduate School during research and writing of this thesis.

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CHAPTER I

INTRODUCTION

Management gaming is a relatively new technique which is gaining widespread acceptance throughout the academic and business world as a method for enhancing the teaching of various management principles. It is to a certain extent controversial in that many people consider it to be a passing fad and not particularly significant to the discipline of management education. The purpose of this thesis is to examine the field of management gaming with particular emphasis upon its applicability to the curriculum at the United States Naval Postgraduate School. In providing graduate education in Management the mission of the School is to ensure the best possible education which can be provided in the time allowed. If management gaming is in fact as useful a contribution to teaching the principles of management as its proponents contend, then the Naval Postgraduate School can very probably improve the caliber of its instruction by its utilization. To date very little use has been made of this technique at the Postgraduate School. Whether it is intended to be incorporated in the future or not, the responsibility still exists to examine its potentials. By reviewing this new area in some detail and investigating the practical factors concerning its feasibility at the Postgraduate School a clearer picture can be obtained as to whether its use should be expanded. By furnishing its background and history in conjunction with a detailed description of different types of management games it is intended to illustrate that gaming does have a contribution to offer here. This background information when combined with the analysis of the running

of a particular game will, it is hoped, provide the impetus for further work in this area.

The first step toward understanding the evolution and ultimate role of management gaming requires a knowledge of the history of management education. Chapters II and III deal primarily with the history of management education and management development programs. Management development programs are discussed both because of their important contribution to the overall field of management education and because of the important role that gaming has taken in many of these programs.

In attempting to critically analyze management gaming it is necessary to review and compare other techniques which are being utilized in the instruction of management principles. Chapter IV describes and compares the most popular of these other methods such as the case method to lay the foundation for later comparison with management gaming.

Chapters V and VI contain the analysis and review of the management games available today providing a description of the different types of games and a discussion of their advantages compared to the techniques of Chapter IV. The possible steps necessary for the incorporation of a management game into the curriculum are discussed.

The remainder of the thesis is concerned more specifically with the problems peculiar to the Postgraduate School. Chapter VII analyzes the applicability of management gaming to the curriculum and endeavors to anticipate problems inherent in the current resources. In addition to looking at the present possibilities a look is taken into the future to predict the potential of the technique assuming certain improvements could be made. The thesis finishes up with appropriate conclusions and recommendations.

The major sources of information for this paper were books and periodicals most of which were obtained from the library of the Post-graduate School. Additional information was gained from individuals such as Professor Cowie who have had experience in the use of or design of management games before their association with this School.

CHAPTER II

HISTORY OF MANAGEMENT EDUCATION

It is difficult to date precisely the beginning of management training particularly with respect to higher education. Even before the advent of the industrial revolution some sort of management or business training was in existence but usually not on the formal basis that exists today. In those days young men learned the business and the various techniques more from apprentice programs than from higher education. Since their life was relatively uncomplicated, experience was often the best teacher. Due to the lack of influence of government, labor, and competition the high degree of sophisitication required of today's managers was unnecessary. As life in the world of business became more complicated it became increasingly apparent that experience as the only method of learning was inadequate and that more formal methods of instruction would be required.

The establishment of the Wharton School of Finance and Commerce in 1881 at Philadelphia is generally recognized as the beginning of the formal education of students for future business careers. From 1881 until World War I business schools were gaining a foothold in the academic world and in a sense struggling for respectability. In the initial period of development the primary emphasis tended to be on economics and consequently the economists of the period played a major role in shaping the curricula and course work. Around the turn of the century and coinciding with the founding of the business school at the University of Chicago there was a gradual shift away from the emphasis and influence

of economics toward more business oriented courses such as railway transportation, finance, and banking.[1] In addition to the schools emphasizing economics, there emerged still another approach which stressed the various aspects of secretarial training and accounting. This emphasis on the more practical side of business training gained increasing support up until the First World War. The fact that business school faculties were having their difficulties gaining full academic accreditation combined with the business world's natural interest in the more practical facts of life gave this area of training additional impetus. In his analysis of business education for the Carnegie Foundation Mr. Frank C. Pierson of Swarthmore College made the following comment on this phase in the history of management education:

> The emphasis on details of business practice naturally attracted faculty members of a strong practical bent. Many of the schools, especially in metropolitan areas, leaned heavily on businessmen or professional practitioners who were willing to give a course or two in some specialized area but whose main interests lay elsewhere. Even full-time faculty members were often closely identified with outside business activities. Taken together, these circumstances did not instill confidence on the part of other college and university faculty members in the new programs. About the period when most of the early business schools had achieved complete administrative autonomy, they rightly or wrongly had fallen to a low academic estate.[2]

The period between world wars was one of great expansion from the situation in 1914 where a few business schools were scattered around the country until 1940 when practically every major college or university in the country had some type of a business school or business department. This was also a period of much specialization and much experimentation in

[1]Pierson, Frank C. The Education of American Businessmen. (New York: McGraw-Hill Book Co., Inc., 1959) 39-41.

[2]Ibid., p. 41.

the field of business education. There also tended to be a proliferation of many different courses and in some cases a movement away from basic fundamentals to a random approach of teaching many diverse subjects.

Probably the most significant contribution made during this period was the development of the case method principally by Harvard and first used there in 1919 as a teaching device. A more comprehensive discussion of the case method will be provided later but for the present suffice it to say that this was the first major step toward bringing to business education the broader view of the business concern that considered the entire operation as an entity instead of studying each aspect separately. One sidelight worth mentioning at this time particularly since this is a current criticism of computerized management games today was the relative high cost of the case method when it was introduced. It is estimated that Harvard spent approximately $100,000 per year from 1920 until 1940 developing and maintaining the case method. Particularly in view of what $100,000 would buy in those days the case method was certainly not inexpensive in its early days of development. Interestingly enough Harvard is still spending about $100,000 per year on this program.[3]

During the years immediately prior to World War II Harvard had considerable influence on the growth of business education. In addition to the spread of the case method this period was marked by increasing emphasis on the teaching of management tools as contrasted to the basic core courses such as accounting, marketing and finance. Considerable speculation arose about whether knowledge of these management techniques,

[3]Ibid., p. 49.

which many thought could only be learned through experience, could in fact be gained in the classroom. This swing toward a management point of view seems a step in the right direction.

The period immediately after World War II was one of great expansion. Business schools had become more respectable and were firmly entrenched throughout the land. In general they broadened their horizons and expanded into new fields such as human relations, forecasting, and management science. Probably the two most important developments of the period from the end of World War II until the present were the growth of operations research and the management development programs.

Operations Research or management science or operations analysis or whatever one wishes to call it actually grew out from quantitative procedures designed to solve many different types of problems in the war. Many people found that the quantitative methods used to solve tactical or strategic war problems could also be utilized to solve business problems. With the emphasis on these mathematical techniques the tools available to the engineer became complementary to the tools of the business student. With these new techniques being stressed schools like Carnegie Tech, MIT, and Purdue came to the fore with their curricula oriented towards management science.

In addition to the spectacular growth of operations research a significant method of management or business instruction was becoming firmly established. This was the management development courses or seminars. Programs were being established by the business schools in conjunction with the business community to teach the various levels of management what was new in the field. Management development has been one of the

more fertile fields for management gaming.

To recap the growth of management education: Its early days were marked by a groping and a struggle for respectability. Primary emphasis was on basic courses such as economics and accounting. The middle years were marked by a search for what should be taught and how to best view the business entity. After the Second World War the more quantitative approach was stressed and this is where we find ourselves today placing more and more emphasis on the quantitative methods of operations research.

CHAPTER III

MANAGEMENT DEVELOPMENT PROGRAMS

Although mentioned briefly in the history of management education the role of management development courses is deserving of additional comment. Since management development plays such an important role in the use of games the history and present status of it is important to our overall theme.

Since World War II the growth of management development courses has been one of the most dramatic aspects of management education. While its beginning dates from the immediate postwar period its forerunner can be traced further back even before the war to the many foreman training programs available at that time. Even then many companies were recognizing the need for broadening the outlook and training of their supervisory personnel. As a result foremen and first line supervision were being exposed to relatively new ideas such as personnel management, planning, and labor relations.

Recognizing these early beginnings, the period after the war was when formal management development programs got their greatest acceleration. The availability of such programs within an academic institution can be traced to 1950 when four were introduced at M.I.T., Harvard, Chicago, and Pittsburgh.[1] From this modest beginning the programs have grown to the point that almost every accredited business school has some sort of management development program.

[1]Gordon, Robert A. and James E. Howell. Higher Education for Business. (New York, Columbia University Press, 1959), 294-295.

These programs can be categorized in basically two ways: (a) who is teaching them, and (b) who is being taught. The former is relatively simple. Companies have the option of either administering the program themselves or of going to some educational institution for the instruction. In determining (a) it is also necessary to consider (b). There are generally three possible decisions to be made. The management development course may be slanted toward newly acquired employees, middle management, or possibly top management. In general companies will set up their own in-house programs for training new employees in either functional areas or overall company operation and organization. On the other hand middle management and particularly top management will normally be steered toward an outside educational institution. In addition to determining who will teach and who will attend it is also necessary to determine what will be taught. This can vary depending upon the audience but in general courses may be broken down into three areas, general managerial competence, specific techniques such as inventory management, and general subjects not directly concerned with business matters.

In analyzing management development programs two basic questions arise, first why so much emphasis, and second is it paying off. A rather cynical view is that companies participate in the programs either because of the tax advantage offered or because everyone else is doing it.[2]

The more logical view is that companies have recognized the need to keep their people up to date on current management practices and the management development programs are a good way to do it. As for the

[2] Case, Fred E. The University View of Management Development Programs. Business Horizons, v. 6, no. 3, Fall 1963: p. 76.

second question there is unfortunately no clear answer available as to their success. In attempting to answer this question the following points can be made:

1. Participating companies have not developed evaluation methods to tell them whether they are getting full value from their educational investments.

2. Programs will produce maximum benefits only over a long period of time and cannot be expected to make significant changes in a manager's job soon after he participates.

3. No programs appear to have enough knowledge of an executive's day-to-day responsibilities to know whether it is developing adequate or superior executives.[3]

As can be seen from the preceding short discussion there is some debate as to the real worth of the programs. For purposes of this study the more controversial points are not as important as the fact that management development programs do provide a natural arena for the use of management gaming. Within this context it is assumed that management development programs do accomplish their objective which is to assist the participants to develop into better executives capable of assuming larger responsibilities.[4] Hopefully management gaming can help them toward that goal.

[3]Ibid., p. 78.

[4]Gordon and Howell, op. cit., p. 300.

CHAPTER IV

INSTRUCTIONAL TECHNIQUES

Having discussed the history and development of management education through formal educational means and management development programs, actual educational techniques can be discussed. The purpose of examining these methods is twofold. First to see what current techniques are being utilized and secondly to lay the foundation for a later comparison of them with management gaming. Obviously there is no perfect way to teach the science or art of management. Almost any given method in the hands of the skilled instructor can be highly effective. This discussion will be concerned with basically three different methods which are most often discussed in the literature relative to their worth compared to management gaming. These are the case method, role playing, and the in-basket technique. First of all it should be recognized that these are not the only three methods available. For example the most basic and fundamental method of lecturing is not singled out since its usefulness is obvious. These methods do overlap depending upon how they are used by individual instructors, however there are enough fundamental differences to warrant their being discussed separately.

The Case Method. The case method has been described earlier as one of the most significant developments to date in management education. The role of the Harvard Business School in the development of the case method should be recognized. In this method the student is provided a written description of a situation which in theory or in actuality has occurred. Given this situation he is asked to analyze the facts of the

case and to develop his own solutions to the problem. The situation may range from something quite simple to a problem containing many facts and many alternatives. The student is required to analyze the information provided, equate the various alternatives, make his decision, and then justify his decision. In a book describing the case method at Harvard Malcolm P. McNair described the case method in this way:

> The student is placed in the position of the business man who must act, who must before he acts weigh the bearing of his activity on a variety of considerations, both short-run and long-run in character, but who must in any event make a decision and implement it.[1]

The example in Appendix A illustrates the process. The student is given certain background information and data upon which he must make his decisions. Although this is a relatively simple case it does show how the technique can be utilized to stimulate discussion and more importantly provide strong incentives for student participation. This brings out the special value that the case method has in providing the students experience in balancing a variety of considerations in a variety of situations.[2]

The great advantage of the case method and the characteristic that sets it apart from previous methods is the way in which it provides for student participation. Instead of listening to the lecture, learning certain principles, and then applying those principles in the form of examinations or home-work assignments, the student is required to contribute much more of himself in the learning process. This is more realistic in that it approaches the real world situation where many facts must be

[1]McNair, Malcolm P. The Case Method at the Harvard Business School. McGraw-Hill Book Co., Inc., New York, N. Y., 1954. In Foreword by Donald K. Hill, p. viii.

[2]Pierson, Frank C. The Education of American Businessmen. McGraw-Hill Book Co., Inc., 1959, p. 218.

considered and indeed simulates the problems where all the facts needed to make the best decision may not be available.

The case method also can be used to illustrate that there does not have to be a single best solution to a given problem. Through discussions with the skilled instructor the students are shown the importance of examining all the alternatives and the problems inherent in trying to quantify intangible factors in day-to-day business decisions.

Assuming that a given case under discussion came from a real life situation additional learning can be obtained by discussing the way the problem was resolved by the real life manager, why it was resolved in that way, and what if any mistakes were made.

While the case method was a most significant step forward it suffers from the disadvantage that it is a one-time situation. The various facts concerning the case are provided for analysis, the decisions are made and then after a reasonable discussion the best decision or decisions are provided and the case is closed. There is no continuity since the decisions made in one case do not normally determine the inputs to the next case. While there is feedback of sorts from the instructor the student is not held accountable for his decisions in the future. Taking into account this disadvantage the case method must be recognized for the great step forward it provided and the great impact it has had on the teaching of management.

Role Playing. A technique which has in effect grown up as a refinement of the case method is role playing. A case is provided but instead of being read and analyzed the given situation is acted out by students taking the parts of the individuals concerned in the case. Appendix B

is an example of a role-playing situation. Role playing is particularly applicable in teaching principles of leadership and human relations. Additional realism is provided by the fact that people are actually involved in the situation and are forced to make decisions under the pressure of an irate employee under pseudo real-life conditions.

The added advantage of realism makes role playing a very useful technique in the proper environment. In addition to having the same disadvantage that the case method has in that the given play is a one-time occurrence the role playing suffers from the fact that it is greatly dependent upon the acting skills of the participants. The very fact that its realism is its big selling point requires the participants to put forth a first-rate performance. There is a legitimate question of whether the goal is to train actors or managers. While much can be gained from a good theatrical performance a poor one is pretty much a waste of time for all concerned.

In-Basket Technique. The in-basket technique is similar to the case method in that it provides the student with a hypothetical work situation in which he plays the role of a business manager and is required to take action on a dozen or more papers or letters he finds in his "in basket."[3] The basic difference in this method is that it is primarily an individual exercise whereas the case method and role playing are generally group discussion evaluations. The most benefit can be gained from the in-basket technique by forcing the student to make a large number of decisions in a relatively short time thereby simulating some of the pressures

[3]Greenlaw, Paul S., et al. Business Simulation in Industrial and University Education. Englewood Cliffs, N. J.: Prentiss-Hall, 1962, p. 11.

of actual operations.

While these three methods are not the only ones being used today others are generally only refinements or modifications of these basic techniques. When the traditional lecturing is added we have the foundation of management education as it existed prior to the introduction of management gaming. It can be seen that the evolution of techniques has come from the relatively one-way approach of the lecture to the situation where more student participation is required and more realism is inherent in the learning process. These methods have brought management education a long way toward simulation of the real world situation. It will now be shown how management gaming overcomes some of the disadvantages and takes us one step closer to the realism desired.

CHAPTER V

MANAGEMENT GAMING

Having traced the history of management education and examined the evolution of its instructional techniques the next phase can now be reviewed. Before examining the advantages and disadvantages of this next step, management gaming, it is necessary to define it, look at its history, and build a vocabulary so that games can be discussed in understandable and meaningful terms.

A review of the literature turns up many definitions of management gaming. To give a representative sample of them two are quoted below. The first is a summary of the consensus of opinion of several of the leading proponents of management gaming which resulted from a symposium held at Tulane University in 1961.

> A business game is a contrived situation which imbeds players in a simulated business environment where they must make management-type decisions from time to time, and their choices at one time generally affect the environmental conditions under which subsequent decisions must be made. Further, the interaction between decisions and environment is determined by a refereeing process which is not open to argument from the players.[1]

Another description from a leading text on the subject says management gaming is:

> ... a sequential decision making exercise structured around a model of a business operation, in which participants assume the role of managing the simulated operation.[2]

In order to define the games more generally certain key words in the

[1]Proceeding of the Conference on Business Games. Tulane University (1961), p. 7.

[2]Greenlaw, Paul S., et al. Business Simulation in Industrial and University Education, 1962. p. 5.

above definitions will be examined in more detail. The words "game" and "exercise" are both important. The choice of the word "game" has been objected to on the grounds that this should be reserved for recreational exercises. Perhaps the word "simulation" if used from the beginning would have provided more of an aura of respectability to the subject initially.

Another key word is "sequential." A management game is not a one-time exercise. It depends upon some sort of feedback to assist the player in making his next decision. The game is continuous and therefore more similar to operations existing in real life.

Also fundamental to the technique is some type of mathematical model. This may be very simple or very complex depending upon the type of game.

From the above discussion it is apparent that a management game in its simplest sense has a rather elementary definition. It is a continuous exercise utilizing a mathematical model which provides feedback to the participants which assist them in making follow-on decisions. With these definitions in mind and before looking at the various classifications of management games it may be well to discuss a hypothetical gaming situation to provide a basic understanding of what it is that management games are trying to accomplish. Assume that an instructor has decided he would like to teach his students certain principles of management and has decided to use a given management game to accomplish this objective. The class could be divided into a number of teams with an appropriate number of students on each team. After the teams have been established the play of the game may be broken down into three separate phases, the briefing, the play of the game, and the critique.

The briefing is a discussion period when the instructor or administrator of the game advises the students in general terms what is to be accomplished in playing the game. This discussion would normally include an introduction to the problem, the various decisions that have to be made, rules of the game, and instructions concerning the administrative guidelines for playing the game. The briefing may be very short or comprehensive depending upon the type of game and also the specific goals of the instructor.

The game is normally divided up into a number of decision periods. Starting normally from a common base with respect to the given situation, the teams make their necessary decisions independently for each period and turn these decisions over to the administrator. Their decisions are then evaluated on the basis of the model and the results returned to the teams. After reviewing the results of the first decision the teams make follow-on decisions which are in turn given to the administrator. This cycle can be continued as long as the administrator sees fit. At some point the administrator stops the cycle and the game is over.

At this point the most important aspect of the game, the critique, is held. This is usually a group discussion where the teams analyze their relative positions and review the decisions that were made. Guided by the instructor they can see what mistakes were made or conversely where good decisions resulted in a specific gain for a particular team. The critique is the most important part of the game since this is where most of the learning can take place through self analysis and review.

The full import of these various factors will become more apparent in later discussions of the more specific features of management games.

Having now a perhaps rather vague notion about what management gaming is and before getting into the specifics, a brief look at the history of management gaming is in order.

The ancestor of management gaming is generally agreed to be war gaming. Although the actual origin of war gaming is difficult to trace it is probable that the original war games were refinements of chess or some other board game. Some of the earliest war games were in fact an amplification of chess in that the common chess board was expanded and in some instances maps were provided which overlaid the playing board. One such game was called New Kriegspiel and was introduced in Germany in 1798.[3] In this game a large map was divided into grids on which soldiers could be moved in the manner of chessmen. It was very complicated however and did not receive general acceptance.

In the late 1800's refinements were made to incorporate the changing art of warfare and also to simplify the administration and running of the games. At this time random events were first introduced by the use of dice.[4] Most of these early developments were made in Prussia but by the end of the Nineteenth Century their use was spreading to other countries. At that time games were broken down into two types called rigid games and free games. The rigid games were characterized by rather extensive rules to reflect the art of war. In the free games human referees with experienced judgment played a major role in the games.[5] Even

[3]Cohen, Kalman K. and Eric Rhenman. The Role of Management Games in Education and Research. Management Science 7:2 January 1961. p. 132.

[4]Ibid.

[5]Ibid.

today there exists the two types of war games as described by M. G. Weiner.

> At the present time the two major forms of war games, the free play and the rigid play, still exist. Both have been employed as techniques for analyzing and evaluating military tactics, equipment, procedures, etc. The free play game has received support because of its versatility in dealing with complex problems of tactics and strategy and because of the ease with which it can be adapted to various training, planning and evaluation ends. The rigid play game has received support because of the consistency and detail of its rule structure and its computational rigor. In addition, the development of large capacity computing machines has made it possible to go through many different plays of a game. With these developments the number and types of war games have increased.[6]

Perhaps the most sophisticated example of a war game in existence today is the game at the U. S. Naval War College, Newport, Rhode Island. First introduced in 1817, it has grown continuously since then and today the Navy Electronics Warfare Simulator (NEWS) is an integral part of the curriculum at the War College.[7]

The technique of war gaming and the value of using them in preparation for war led to the transfer of the method to the teaching of management. Along with the development of war gaming two other major milestones occurred which gave the development of management games their great push forward. These two developments were first the work of Von Neuman in the theory of games and secondly the tremendous growth in the field of electronic computers. In fact Cohen states that "...the availability of electronic computers has been the most important factor

[6]Weiner, M. G. An Introduction to War Games P-1773. The Rand Corp. August 17, 1959.

[7]For a comprehensive discussion of the history and present use of NEWS, see "Gaming at the War College" by Francis V. McHugh, U. S. Naval Institute Proceedings, March 1964.

determining the speed with which management games have developed in the last four years."[8]

The first well-known management game was developed by the American Management Association. Using current war games as its base, the AMA began development of its first game in 1956. Called the AMA Top Management Decision Simulator, the game was developed for use at the Association's Executive Decision-making Program at the Academy for Advanced Management at Saranac Lake, New York. This game is considered to be the first non-military competitive business game.[9]

The AMA Top Management Decision Simulation calls for teams of players, usually three to five per team which represent the top management of a firm. There are usually five teams which compete with each other in the production and sale of a particular product. The basic decision period is one-quarter of a year and the game is normally played for five to ten years, i.e. for twenty to forty decision periods. In this game each team has six decisions to make each quarter. The product selling price, the marketing expenditure, research and development expenditure, rate of production, plant expansion and competitor research expenditures must be reviewed and determined for each play of the game. In this game the mathematical model is relatively simple and while results could be determined manually, a computer is used to speed up playing of the game. The IBM game which will be discussed later in this paper was an outgrowth of this first AMA game.

[8]Cohen and Rhenman, op. cit., p. 134.

[9]Greenlaw, op. cit., p. 14.

From this beginning in 1956 until today the number of management games has grown at an ever-increasing pace. The best illustration of this is a listing of over eighty management games found in Kibbee's book Management Games.[10] With this large number of games in existence today it is necessary to classify them in some way in order to discuss them in a logical manner.

Due to the important influence of the computer in management gaming one of the most important aspects of a given management game is whether it is mechanized (i.e. computerized) or manual in nature. Along with the development of the AMA game another milestone in management gaming was the development of the highly regarded Andlinger Game developed by G. R. Andlinger and J. R. Greene. This game was described in the Harvard Business Review for March-April 1958 and since then has been widely known and used. This game is manual since it requires a group of clerical people to perform the necessary calculations. A more specific discussion of this game is found in Appendix C.

Initially the role of the computer was largely that of speeding up the calculations to enable more periods of the game to be played in a shorter period of time. As has been mentioned above the AMA game was computerized initially for this reason. It is also true that having the computer incorporated into the running of the game added a certain amount of glamour to the game and undoubtedly assisted the proponents of management gaming in gaining acceptance for their fledgling technique. As more sophisticated games were developed, however, and the mathematical

[10] Kibbee, Joel M. et al. Management Games A New Technique for Executive Development, 1961: p. 315

models upon which they were based became more complex, the high speed computer became more of a necessity and less of a toy. As more and more variables and decisions were introduced it soon became impractical to perform the necessary calculations on hand calculators. Another advantage of having computers do the work was that more legible and accurate output could be provided which tended to ensure that the participants were at least confident of the mathematical results of their decisions.

One important and often overlooked aspect of using a computer is the fact that computers are expensive and careful consideration should be given to their use to ensure that their usefulness warrants their expense. This analysis leading to the decision to use a computerized game required that such things as the complexity of the game, the speed with which answers must be provided, and availability of clerical help must be considered. It is interesting to note in this respect that Mr. Warren Pelton of the Systems Development Corporation in response to a question during a presentation on STEPS[11] stated that he did not know what it was costing his company to run the game.

In addition to being either manual or computerized games are described as being functional or total enterprise. A total enterprise game is one in which the operation of an entire concern is simulated. This may be further broken down by type of industry concerned with a specific product or the product may be unspecified. The Carnegie Tech Game is an example of a total enterprise game dealing with the various functions of an enterprise based on a fictitious detergent industry.

[11] Staff Training Exercise for Programming Supervisors, a game developed at Systems Development Corporation.

The IBM game deals with a nondescript product with general decisions required. The purpose of these types of games is to teach general decision making techniques rather than instruct in the specific details of a given functional area such as inventory control or quality control.

In contrast to the total enterprise games the functional games are designed to teach the various functional techniques of management such as marketing, production control, and material management. Some of the current functional games are General Electric's Dispatch-O, Uniflo, Inventrol and Simuload,[12] which are primarily concerned with production control and inventory control. In general the functional games tend to be more difficult to design due to more quantitative nature of the work being performed in the simulation.[13] It would seem that functional games should be considerably more useful and adaptable to use in the management development courses particularly where the emphasis is on teaching middle management. In these instances the participant is less interested in the overall function of the enterprise than in the specifics of his particular job.

Business games are also classified either as generalized or specific industry games depending upon whether a specific known product or business is simulated or whether the actual product remains undefined.

From the educational point of view a case can be made for either type. First of all the generalized games can to some extent prevent transfer of knowledge and in that way preclude participants from making decisions in a certain way because "...we do it like that at the office."

[12]Greenlaw, op. cit., p. 19.

[13]Greenlaw, op. cit., p. 20.

On the other hand some proponents believe that the lack of specificity reduces the realism of the game and particularly when management gaming was first trying to gain acceptance the simulation of real world enterprises increased the probability of acceptance.

Management games may be either interactive or non-interactive. An interactive game is one in which the decisions of one team affect in some way the results of the other teams. In effect the game is competitive since an increase in marketing expense by one team relative to the opponents' marketing expense, all other variables being equal, will result in that team's getting a greater share of the market.

Non-interactive games quite often are functional in nature and the participants are competing against the game in essence and not against another team.

A further method of differentiating between different management games is whether or not random events are introduced into the game by the model. The model may be designed to react only to the decisions made by the participants so that there is a definite direct relationship between the decision and the result. To provide some sense of realism in the game some designers inject chance events such as strikes, or some disaster into the game. Of course some caution must be introduced when using random events or the value of the game may be lost.[14]

Management games have been designed to incorporate a myriad of different concepts and requirements of management education. As can be seen from the above discussion many different factors must be considered in the design and use of a management game. One additional characteristic

[14]Greenlaw, op. cit., p. 25.

which actually incorporates many of the different criteria delineated above is that of complexity of the game both with regard to the playing, administration, and in its actual design. One of the most complex games being used today s the Carnegie Tech Game. It is highly complex and requires participants to make 100 to 300 decisions for every period of simulated play.[15] This is contrasted with the relatively simple IBM game which requires six decisions per period.

The best way to summarize this overall description of management games is to underline the fact that there are available today a large variety of management games covering a large number of the functions of management and also suitable to any prescribed budget or teaching situation. The real decision of the educator becomes that of whether he does or does not want to utilize a management game in his curriculum, and if he does he must make very real decisions concerning the depth to which he wants to plunge.

[15]Cohen and Rhenman, op. cit , p. 139.

CHAPTER VI

MANAGEMENT GAMING AS A TEACHING TECHNIQUE

Having acquired a basic understanding of what management gaming is and also what it is trying to accomplish the more important issue, that of its applicability as a teaching technique, can now be examined. By now a small appreciation of the work and expense management gaming requires should have been gained. It is not something that should be adopted haphazardly.

This is a new technique in what is a relatively new discipline. From a practical point of view it may be too early to attempt to judge it or to compare it with other methods of instruction. Timeliness notwithstanding management gaming is being scrutinized with a critical eye and quite naturally being compared with other methods. This being the case the approach will be to indicate the criticisms being leveled against management gaming, counter this criticism with the stated advantages and finally compare management gaming and the other popular techniques.

For purpose of discussion the stated disadvantages or criticisms are broken down into five basic categories. These are:

1) Games are unrealistic.

2) Management games overemphasize the quantitative aspects of management.

3) They penalize ingenuity.

4) Their cost is prohibitive.

5) Games have not been validated or proven effective.

In examining these criticisms the applicable advantages will also be discussed and the particular criticism or advantage related to the other

techniques of management education.

Management games are unrealistic. For example, the participants realize they are just playing a game and consequently do not take what they are doing seriously.[1] Due to the rigidity of the mathematical models involved it is suggested that the more subtle conditions of the market or business world cannot be reflected in the play of the game. To a degree this is a valid criticism. Realism however is a relative thing and it pays to keep in mind what gaming is trying to accomplish and also the evolutionary nature of the various methods of instruction. Is the ultimate goal to be able to simulate perfectly the real world situation so that every conceivable possibility could be provided for in the play of the game? There is some question as to whether this is really necessary. First of all consider the infinite number of possible problems which could arise in a given business environment. Many years could easily be spent trying to cover every possible contingency. Even then the problem you did not include might very well arise. With this in mind perhaps emphasis should be placed upon teaching basic principles and how to apply them so that when the one-in-a-million occurrence does arise it can be analyzed and resolved. For this reason proponents of management gaming feel that it is not as important that management games are realistic as it is that they seem realistic. It is precisely this point that makes management games an improvement over the case method and role playing. The continuity and feedback provided by management gaming make them more realistic relative to these methods if not relative to the real world. The fact is that

[1]Stewart, Lois. A Survey of Business Games. Simulation and Gaming: A Symposium. AMA Management Report No. 55, 1961, p. 21.

they do seem realistic. The best evidence of this point is the arguments and even fisticuffs which have broken out during the play of games. The discussion of realism can best be closed by stating that management games are the best technique developed to date which enables the student to analyze a set of conditions, make a decision, see the results of that decision and then make the follow-on decision. Looked at from this point of view management games come very close to simulating the real world situation.

Management games overemphasize the quantitative side of management. A point is made of the fact that most games are based primarily upon quantitative, not qualitative, aspects of decision making. An example is made that a dollar spent on advertising has the same effect for each team, all other conditions remaining constant, whereas in real life this might not be true since the skill of the different advertising departments would definitely come into play.[2] Interestingly enough the case method is criticized because it emphasizes the qualitative aspects and not the quantitative aspects of business. It is true that management games do emphasize the quantitative approach primarily because the more abstract side of business such as leadership is very difficult to build into a mathematical model. The use of random devices has been one way this problem has been resolved. Another technique utilized in STEPS calls for individuals to appear in person at certain times to argue or discuss problems with the boss.[3] This brings us right back to the question of what we are trying

[2]Martin, E. W., Jr. Teaching Executives via Simulation. Business Horizons, No. II, Summer 1959, p. 103.

[3]Pelton, Warren. Steps a Management Game for Programming Supervisors. Datamation, November/December 1959.

to accomplish. Gaming is a technique for teaching certain specific principles. In a given situation the selection of the proper game and proper administration can provide for the accomplishment of many different objectives. It is very possible that for the teaching of the more environmental side of management the case method is in fact superior. Depending upon how the games are used they may be potentially more valuable in the qualitative fields but at the present time they do emphasize the quantitative side of management.

A further point in this regard, which is interesting in that it illustrates the semantic problem again, has been made by Arnold Amstutz of M.I.T. He feels that the games do not emphasize the quantitative approach enough and that they do not provide for utilization of the newer tools such as linear programming and game theory.[4] Some work has been done at Carnegie Tech where a computer has actually been used to assist teams in solving their problems using different quantitative techniques.[5] These diverse criticisms illustrate the problems in discussing gaming since people's points of view may differ significantly. It further illustrates the importance of analyzing the given curriculum, determining the set of objectives and selecting the proper method of instruction to fit that particular situation.

They penalize ingenuity. Management games have been criticized because they tend to penalize ingenuity. In dealing with a problem that

[4]Amstutz, Arnold E. Management Games a Potential - Perverted. Industrial Management Review, v. 5, no. 1. Fall 1963.

[5]Haines, G., F. Heider and D. Remington. The Computer as a Small Group-Member. Administrative Science Quarterly, 1961.

requires a mathematical model for its solution it is necessary to place certain constraints on the variables or it would be impossible to find a computer large enough to cope with every contingency. This may put the damper on the team with a unique or unorthodox strategy. This problem is not insurmountable however and could be handled by either flexible game design or by letting the administrator make changes to the parameters of the model.

The case method and its allied methods normally have no constraints built into them, consequently any wild solution could be put forward, but of course the student still must justify his action.

Cost. Business games, particularly those involving a computer, can become expensive. The cost can be broken down into different categories. Assuming the game is to be designed the cost of design and programming including the check-out, must be considered. This cost can be reduced by using a readily available game or perhaps by modifying an off-the-shelf game. Once the game is obtained the costs of administration and computer time must be considered. If a manual game is utilized the cost of the clerical help must be included. While these costs may in fact be substantial the case method also can be expensive. As has been noted previously Harvard spends considerable moneys maintaining their cases.

The relative point would seem to be that the costs of gaming should be recognized and isolated so that these costs can be compared to other methods currently being utilized. This requires us to put a price tag on current methods also to ensure a valid comparison. Once the different methods have been priced out it should be merely a question of deciding which method will give the best return on the investment. While this may

sound simple enough it brings us to the next criticism of management gaming.

Games have not been validated or proven effective. The easy way out of this dilemma is to state blythely that the other methods have not been proven effective either so let us not worry about management gaming. This head-in-the-sand approach is not acceptable simply because gaming is on trial and the other techniques are not. Additionally it is important for us to know if something which seems to be so enjoyable is actually doing the job. In reality it is probably still early to tell for certain how effective or ineffective the technique is. The majority of methods utilized to date in attempting to validate gaming as a technique have utilized questionnaires of one sort or another. Alumni of schools using games have been queried on their opinion of gaming.

At least one attempt has been made to directly compare the results of teaching by the case method and by management gaming. In discussing the results of this test McKenney states:

> The game-session experiment indicated that business gaming has some demonstrable advantages as a teaching device. In this case, it did bring out the interrelationships of functional decisions within a firm. In addition, involving students in an active decision-making role in an ongoing situation such as a business gaming session results in a simulated planning experience--an experience which "teaches" them something about the art of planning. The results of the experiment indicate that games do serve a useful purpose when used as a pedagogical device for gaining insight into the process of planning.[6]

McKenney in his analysis gave examinations to groups who had participated in gaming and those who had studied under the case method. Other attempts have been made at grading the performance of participants. While initial

[6]McKenney, James R. An Evaluation of Business Games in an MBA Curriculum. Journal of Business #3, XXXV, 1962, p. 286.

steps have been taken in the validation of management games this aspect has been the most neglected to date and is receiving considerable emphasis at this time.

In trying to examine the various advantages and disadvantages of management gaming and in particular compare gaming with such techniques as the case method, role playing or the in-basket technique the tendency is to become enamored with one particular method. This is a dangerous tendency and not in the best interests of good management education. While certain rabid proponents may look at management gaming as the ultimate technique it is perhaps more sensible to place it in its proper perspective. It is an improvement over other methods for teaching certain principles or techniques. In the areas where it is applicable it seems to do an excellent job of holding students' interest and illustrating to them the day-to-day problems of organization and business decision making. In examining the use of gaming in the over-all curriculum however it must be recognized that the best program may be one which effectively utilizes several methods. Management gaming has certainly made its mark and seems to have almost unlimited potential but this does not infer that all other methods should be thrown in the trash can.

Having examined some of the pros and cons of management gaming and the other techniques, let us now assume that a department or faculty has decided to incorporate some sort of management gaming into their curriculum. The steps they might take in the analysis, selection and incorporation of a management game are of interest.[7] Decisions must be made as to

[7]Most of the information on selection and installation of a management game is based on material in Management Games by Kibbee, Craft et al. op. cit., pp. 49-59.

whether games will be utilized to teach specific functional tasks or to teach the entire firm concept or both. Whether the game will be used in a specific course or courses must be weighed against the possibility of integrating the game within the curriculum so that it can be used continuously and as the students are instructed in specific areas these new skills can be incorporated into the game. This also requires a decision on what specific game to use. As has been mentioned previously there are many games available which might be incorporated. It may be that none of the off-the-shelf games are considered to be satisfactory. In this case the best decision may be to design one to fit the specific needs of the department. This of course may cause an unacceptable delay in getting under way and it may be best to start with an off-the-shelf game and at the same time begin the design of a more appropriate game.

Underlying all these decisions is the status of available resources both in money and personnel. The games are not inexpensive and it may be that the constraints of time, money and people will pretty much dictate how elaborate the set-up will be. Included in this resource constraint are the problems of computer availability and even the necessary space to run the game. Clerical help will be needed and if the game selected is relatively complicated it will probably require fairly highly paid personnel to act as umpires or administrators.

One point which cannot be overlooked in the selection or design of the game is the skill of the average student who will be playing. While it is true that the game should require the student's best efforts, little is to be gained from exposure to a given business situation which is so complex that the participants never realize what is going on.

In this section we have tried to enumerate most of the important pros and cons of management gaming and reviewed its potential in the curricula. Assuming that management gaming can play an important role in the curriculum several of the steps necessary for incorporating the game have been appraised. The milestones necessary for incorporation of a management game have been summarized by Dr. Kibbee and are quoted below.

1. Define the characteristics of the course including its content; the strengths and weaknesses of the instructor; and the abilities and interest of the students.

2. Determine the resources available for the program in terms of finances, time, staff, and computing facilities.

3. Obtain information on all games under consideration from published material, professional organizations or the game builders.

4. Narrow the choice of game down to a few in which the instructor can participate or observe.

5. Select the most suitable game in light of the above criteria or modify an existing game. If neither of these alternatives will provide the proper game, consider designing one.

6. Schedule the game selected in the over-all program in such a way as to achieve maximum impact in the course.

7. Evaluate the use of the game to see whether the teaching objectives were reached, and to learn how the program can be improved.[8]

[8]Kibbee, Craft et al., op. cit., p. 59.

CHAPTER VII

MANAGEMENT GAMING AT THE UNITED STATES NAVAL POSTGRADUATE SCHOOL

Having obtained the necessary background information, the use and potential of management gaming at the United States Naval Postgraduate School may be reviewed. In order to evaluate the games effectively several facets of the problem must be isolated and analyzed. It is necessary to review the mission of the School particularly with regard to the Management Department and to reflect upon how management gaming might assist the School in performing that mission. The available resources must be reviewed to ensure that they are adequate, assuming a program of management gaming is undertaken. And finally it is necessary to review the applicability of the program with respect to the students who are participating in the game.

To assist in this evaluation a management game has been run using a class at the School. The purpose of this chapter is to examine the applicability of management gaming at the School through discussion of the needs of the School and by a general analysis of the game that was run.

To begin the discussion, the mission of the United States Naval Postgraduate School is quoted:

> To conduct and direct the Advanced Education of commissioned officers, to broaden the professional knowledge of general line officers, and to provide such other indoctrination, technical, and professional instruction as may be prescribed to meet the needs of the Naval Service. In support of the foregoing to foster and encourage a program of research in order to sustain academic excellence.[1]

Since this definition is rather general the more pertinent mission of the Management Department would be of more interest to the current discussion.

[1]Catalogue for 1963-1964 U. S. Naval Postgraduate School, Monterey, California.

Since no mission as such is written down for the Management Department perhaps it is better to examine the mission of the Management School when it was first established under the assumption that the basic mission has not been changed by the reorganization of 1962. At that time the stated mission of the Management School was to:

> ... provide an educational program for officers in the application of sound scientific management practice to the complex organizational structure and operations of the Navy with a view to increasing efficiency and economic operation.[2]

The latter statement underlines a fundamental point which must be resolved before proceeding further in the analysis. This is the degree of emphasis which is to be placed upon Naval applications for management. The philosophical discussion of the extent to which courses must be designed to fit the Navy's needs is not a concern of this paper. It is certainly important to recognize the problem however, especially where it affects the application of management gaming. It is true that in general off-the-shelf management games will stress management applications which are more applicable to non-military business. It would seem however that the basic principles of management, if properly taught, can be applied to the military as well as the civilian enterprise. A review of the current course catalog bears out the fact since only five out of the approximately twenty-five courses offered have specific military application.

It is true that certain available games may be more applicable to the School's needs than others. For example the game utilized as a trial run and described in Appendix A places heavy emphasis on marketing

[2]Op. cit., p. 10.

and production. Perhaps one of the more functional games would be more desirable tied in with courses in financial or inventory management. In keeping with the School's present approach of teaching general management principles rather than specific Navy applications the initial adoption of management gaming should not be handicapped by the lack of games which stress military management. Initially the emphasis should be on developing the skills required to administrate management games properly. After this has been done and the applicability of gaming has been assumed, thought could be given to obtaining or perhaps designing games more specifically oriented to the military situation.

In the adoption of management gaming into the curriculum an analysis of the feasibility of gaming from an economic point of view is required. This analysis can be broken down into categories such as availability of personnel, funds to obtain or design games, the actual physical space required to play the game, and of course the availability of data processing services.

The availability of competent people to administer the game should not be a major problem. At the present time for example there are at least three members of the faculty who are quite conversant with management gaming and one quite capable of administering and in fact designing them. If a more elaborate policy of management gaming is to be adopted it would be necessary to take a more long-range approach than to just look at who is available today. It is not too great an assumption to make that once management gaming has been adopted on a larger scale, competent people can be obtained to administrate it. Once the gaming had been established assuming that it continued to provide the proper

return it would in fact become the responsibility of the department to ensure the personnel were properly trained in its use.

The funding problem should not inhibit the use of games at least initially. As a starter the IBM game used in the trial run could be used. Other games of a similar type could also be obtained. Considerable flexibility can be built into these games by adjusting the appropriate parameters. To take the long-range view additional funds may be required when it has been determined that more specific games must be designed. The point is that games are available at little or no cost which can be utilized throughout an extensive trial period. The cost of the administrator's time must be considered but it is true that he must be spending a significant portion of his time on whatever method he is utilizing in the instruction of his class.

While the physical facilities for running the game are not optimal experience gained in the trial run indicated that adequate facilities are available. Room 400 in Spanagel Hall was used and found to be quite satisfactory. There was sufficient room for each team plus the administrator to have the required amount of privacy. It would be more desirable for each team to have its own room perhaps but the teams did not seem to be inhibited by the fact that they were all in the same room. It would be desirable to have the game run or the decisions being made in closer proximity to the computer as it was inconvenient to travel four decks to get the computer output. While more elaborate facilities would definitely be desirable the existing facilities are adequate and should not have a detrimental effect on the results of the game.

In the one time play of the game the data-processing went quite

smoothly. As has been mentioned, the accessibility was a slight inconvenience but the actual running of the game worked very well. The IBM game which was used is very simple to run and has a very short running time, consequently it was possible to interrupt current runs very easily. A more complicated game may require more coordination but it is not anticipated that the data processing aspects of the gaming would offer any sifnificant roadblocks.

There do not seem to be any insurmountable problems which preclude management gaming from taking its place in the curriculum at the Postgraduate School. One additional aspect of the games use which while not paramount is of some importance is the students' reaction to the game.

Before commenting specifically on the students' reaction to the trial run a brief description of how the game was run will be given. The game was administered to a class which was taking a course in advanced management science. The students in the class were above average based upon their performance to date in the Management Curriculum. They were provided a brief resume of what the game was set up to do and the rules for play. This outline was provided four days before the actual game to enable the students to give it prior study. In addition to the resume the students were given a rather comprehensive questionnaire which was to be completed after the game.

As has been mentioned the game was set up in Spanagel Hall room 400. A briefing was given to answer any specific questions resulting from the reading and to establish the appropriate administrative rules. The game continued all day for twelve decision periods or three simulated years. A keen sense of interest was readily apparent throughout the play. The

critique was held on the next two regularly scheduled class periods. The first period was devoted to the individual teams discussion and analysis of their performance and the second period consisted of the instructor's evaluation of how the teams performed.

In general the students' reaction to the game was very enthusiastic. Several commented that it was the high point of their academic exreri-ence to date. Perhaps more important than the great enthusiasm voiced by the students was the fact that all the teams were putting to use the tools they had been exposed to earlier in the curriculum, such as marginal analysis and organization theory. There was some criticism that they did not have time to apply the more quantitative methods. This shortcoming might be corrected by using a different game or perhaps by allowing more time between decisions.

While it must be recognized that this was a rather small sample with what could be considered a relatively select group, the fact remains that the technique was very well received and interest was very high. The best example of this was the fact that one student suggested that the game be run on the week-end or on a holiday to enable uninterrupted play.

Based on the experience of administering this game there does not seem to be any major obstacle in the way of incorporating the management games into the regular curriculum. The facilities existent are adequate; there are qualified personnel available to administer the games and student interest would seem to be high. Additionally based on the experience of the first running the games provided an excellent tool for tying together several of the areas of course work the students had been exposed to earlier in the curriculum.

CHAPTER VIII

CONCLUSIONS AND RECOMMENDATIONS

The universal acceptance of management gaming is becoming increasingly more certain. By tracing the history of management education from its earliest beginnings through its various stages and by examining the different educational techniques which were utilized throughout that development the position of management gaming in that natural evolution has been illustrated. The mission of the United States Naval Postgraduate School and the responsibilities that fulfilling that mission place upon it should be clear.

The analysis of the Management Department curricula indicated that management gaming can play an important part in the instruction of management students. Based on an admittedly small sample the feasibility of management gaming has been illustrated. With this background information in mind it is appropriate to make several conclusions and recommendations.

Conclusions

1. Management gaming is the next evolutionary step in the teaching of management.
2. Management gaming can offer a significant contribution to the curricula at the U. S. Naval Postgraduate School.
3. Adequate resources are available at the School in the form of available games, qualified personnel, facilities, to establish and run an effective management gaming program.

Recommendations

1. That the currently available IBM game be used as much as possible in appropriate courses to enable the faculty to become familiar with the gaming technique.
2. Following this, an aggressive program be developed to incorporate the game into the curriculum in conjunction with other proven techniques such as the case method, lecturing, and role playing.
3. That as experience is being gained with the available game, a program of research into the availability of games which are more applicable to the Navy's need be made.
4. A library of appropriate games should be developed to enable the teaching of a broad spectrum of subjects.
5. A program of evaluation and validation of the technique be established and administered.
6. Looking to the future, explore the possibility of combining the available management games with the war gaming which is being reviewed at the School.
7. Work toward improvement of the existing facilities.

It is recognized that stopping at this point leaves much work to be done. The purpose of the thesis was to explore the field of management gaming to endeavor to determine if it could be useful at the School. Hopefully it has been illustrated that gaming is both feasible and desirable. With this start perhaps others can carry on to make this apparent feasibility a reality.

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APPENDIX A

AN EXAMPLE OF A TYPICAL CASE STUDY[1]

DEW-MAC's PRINT WORKS
Purchasing and Inventory Control

The Dew-Mac's Print Works was established in 1920 in Lincoln, Nebraska, by two brothers, John and Joe Keller. Both of these brothers had worked for a large local print shop and were dissatisfied with their positions. After careful study of the opportunities in the printing business, they made arrangements to purchase a small building with an extra plot of land adjoining. Both the men had made excellent contacts with local firms which required quantities of printed matter.

Offering a complete line of printing, Dew-Mac's business began a slow but steady rise, until in 1925 the volume of work became sufficient to require the hiring of additional help. After carefully analyzing their needs, the brothers decided to employ two experienced printers and one unskilled man to get supplies from the storeroom and to do other odd jobs which up to now had been done by the brothers. The additional help was secured, and thus the brothers had more time to contact other business firms which they formerly had been unable to serve.

The company continued to grow slowly even during the depression when many other printing houses failed. This steady growth was a tribute to the careful manner in which the brothers planned the purchase of each machine, the hiring of each printer, and the taking on of each new printing line and sales territory. Today Dew-Mac's employs about 50 persons,

[1]This example is taken from Cases in Management by Henry M. Cruickshank and Keith Davis. Richard D. Irvin, Homewood, Ill., 1954.

mostly skilled workers.

With all the careful planning and studying which the brothers did, they neglected the matter of inventory. The result was considerable waste in purchasing materials and delays in finishing work. This matter came especially to their attention through the loss of a major customer whose order could not be completed on time because Dew-Mac's ran out of materials for the job and was unable to obtain other materials in time to finish.

The purchasing of paper and supplies is not under anyone's personal direction. As each individual printer needs additional supplies, he checks the storage area. If he thinks the stock is insufficient, he informs one of the brothers, who makes the necessary purchase. Many purchases are made by telephone. This method has resulted several times in duplicate orders of the same stock, which has caused the small storage space available for supplies to become insufficient. If the brothers want to know how much stock is on hand, they count the stock in the storeroom. This is a difficult job because the stock is placed in the storeroom in any available space. As a result no one knows exactly where any specific stock of paper is located.

The brothers called in Robert Smith, the foreman of the shop, and asked him for suggestions on the control of the inventory. Mr. Smith believes that he should be allowed to control the inventory by having the men report their needs to him. He also feels that one unskilled worker could be placed in the storeroom for the sole purpose of bringing out needed supplies. Mr. Smith thinks that, by having the men report supply needs to him, he would eliminate the duplicate orders which have been made.

John and Joe Keller believe that an addition should be built onto the storeroom to provide adequate space. This would allow the Print Works to keep a good supply of all stock so that no one would run short on a job. The brothers believe that racks should be set up so that the stock could be neatly stored, and each type of stock should have its own separate rack. Joe believes that inventory cards should be set up so that anyone in the concern might know the amount of stock on hand and how much of each particular stock is used. Both brothers believe that a man should be hired to take charge of the storeroom and all purchases.

QUESTIONS

1. What are the deficiencies in the present method of purchasing and inventory control?

2. What do you think of Mr. Smith's recommendations for improvement? If supply needs are to be reported to Mr. Smith, should he make the purchases?

3. Do you approve of the improvements proposed by the brothers?

4. Present a plan of action for the system of purchasing and inventory control.

APPENDIX B

AN EXAMPLE OF A ROLE-PLAYING SITUATION[1]

ROLE-PLAYING: The Case of the Frustrated Supervisor

(Students are asked not to read the case materials before participating the laboratory exercise.)

A. Preparation for role-playing.

1. Class is to be divided into pairs seated side by side.

2. One member of pair is to take the role of Jim Wells; other member, the role of Bill Jackson. Each reads only the instructions for his own role.

3. Bill Jacksons leave seats; at a given signal they return and role-playing begins.

B. Role-playing.

1. Pairs play simultaneously. They should finish after about 15 minutes of interaction.

2. When half of the pairs have finished, the instructor can give the others a two-minute warning.

C. Discussion.

1. Determine how each of the Bill Jacksons feels toward Jim Wells.

2. Determine how each of the Bills feels toward Joe.

3. Determine from each Jim Wells what he could do better next time.

4. Determine what was done in each case to prepare Bill to return to his job and work with Joe.

5. Determine the degree to which each Bill is prepared to meet his neighbor.

[1]Maier, Norman F. Psychology in Industry, Houghton Mifflin, 1955, pp. 106-109.

6. What could Wells have done to make Bill feel better about the neighbor?

7. Other points should be discussed as the class wishes. No specific conclusions need be attempted by the class or contributed by the instructor. The objectives are to increase sensitivity to feeling, stimulate a permissive attitude, and develop listening skills.

D. Materials for the case.

1. ROLE FOR JIM WELLS, DIVISION SUPERVISOR

You are the supervisor of a division employing about 75 men and women and 6 first-line supervisors. You like your job and the supervisors and employees who work for you, and you feel that they cooperate with you in every way.

This morning you noticed that one of your first-line supervisors, Bill Jackson, was rather late in getting to work. Since Bill is very conscientious and was working on a rush job, you wondered what had happened. Bill is thoroughly dependable, and when something delays him he always tries to phone you. For this reason you were somewhat concerned and were about to call his home when one of Bill's men, a young fellow named Joe Blake, came in. Joe is a good-natured kid, just out of high school, but this time he was obviously angry, and said that he was not going to work for Bill another minute and was going to quit unless you got him another job. Evidently Bill had come in, started to work, and then lost his temper completely when young Joe didn't do something quite right.

Although Bill occasionally has his bad moods, it is unlike him to lose his temper this way. This latest rush job may have put him under

too much pressure but even so his outburst this morning seems difficult to explain on any reasonable grounds. You feel, therefore, that something must be seriously wrong and if you can get Bill to talk about whatever it is that is bothering him, you may get the situation straightened out. In any case you are determined not to get into an argument with Bill or criticize him in any way. Instead you are going to try to get him to talk about his troubles; you will listen to what he has to say, and indicate that you understand how he feels about things. If Bill seems more angry than Joe's mistake would reasonably justify, you might suppose that there is something more behind all this and Bill would probably feel a lot better if he got it off his chest. If Bill is thoroughly angry with Joe, you may suggest that Joe be fired in order to demonstrate that you have not taken Joe's side in the matter.

You talked with Joe for several minutes and, after he had told his side of the story, he felt better and was ready to go back on the job. You just phoned Bill and asked him to drop around when he had a chance. Bill said he'd come right over and is walking toward your office now.

2. ROLE FOR BILL JACKSON, FIRST-LINE SUPERVISOR

You have just come to work after a series of the most humiliating and irritating experiences you have ever had. Last night your next-door neighbor, Sam Jones, had a wild, drunken party at his house that kept you awake most of the night. Jones is a blustering, disagreeable man who has no consideration whatever for others. When you called him at about 3:00 A.M. and told him to be less noisy, he was abusive and insulting. Things quieted down later on, but when you finally got some rest, you overslept.

Since you were in the midst of a rush job at the company, you skipped breakfast to hurry to work. As you were leaving the house, you noticed that someone had driven a car across one corner of your lawn and torn out several feet of your new hedge. You were certain that Jones or one of the drunks at his party had done it, so you ran right over to Jones's house, determined to have it out with him. He not only denied everything, but practically threw you out and threatened to knock your teeth out if you didn't shut up and behave yourself; and you knew that he was big enough to do it.

When you came to work, more than an hour late, your nerves were so ragged that you were actually shaking. Everything conceivable had gone wrong. The last straw was when you discovered that Joe Blake, a young high school recruit, had made a mistake that delayed you several hours on your rush job, or at least it would have if you hadn't caught him in time. Naturally you gave him a good going over for his carelessness. Blake said he wouldn't take that kind of abuse from anyone and walked out on you. You noticed that he went in to see your supervisor, Jim Wells. Obviously he is in there accusing you of being rough on him. Well, you don't like that kind of attitude in a young squirt either, and if he has gone in there squawking you'll make him wish he'd never been born. You have had all you can stand and the big boss had better not get tough with you because he'll have one hell of a time getting the job done without you. Jim had that sniveling brat in there and talked to him for quite a while before he phoned you to come in. Gabbing when there's work to be done--that's certainly a hell of a way to run things. You are on your way to Jim's office now and have no intention of wasting time on words.

APPENDIX C

A MANUAL GAME DISCUSSED[1]

The manual business games were the first positive step in adapting the principles of war gaming to the business environment. Even today there are certain basic advantages in using the manual games. The first of these advantages is that the games are relatively simple to administrate and since they do not require a computer are less expensive to run. This means that some sort of management gaming is within reach of just about anyone who is interested regardless of their budget.

The fact that the games are simpler does not mean that they are appreciably less realistic. If the design is skillful there is a degree of verisimilitude which is adequate for most situations. Care must be taken when comparing any manual game to any computer game since there are degrees of complexity within each category. A well-designed manual game would seem to compare quite favorably with the basic medium complex computer game. The glamor of the computer is missing but it does not seem to make significant changes in the learning process if the results are being computed on a calculator and not on the computer.

To illustrate a manual game and to analyze how they are administered we have chosen the "Andlinger Game" or the McKinsey Game as it is sometimes called. The "Business Management Game" was designed by G. R. Andlinger and J. R. Greene who are associated with the McKinsey

[1]Most of the information in this section is based on the article "Business Games--Play One!" by G. R. Andlinger which appeared in the Harvard Business Review, March-April 1958. Sets of the game with boards and company history and instructions are available from the Harvard Business Review.

Company. This game was discussed in the Harvard Business Review and since then has been widely used in many different situations.

The Andlinger game deals with the marketing, production, research and development, and general management of companies in the capital goods industry. The game is both deterministic and probabilistic in that some of the results are determined by the actions of the players and others are as a result of chance. In general the longer the game is played the less the influence of random events. The game is concerned with one product in the capital goods industry with two or three teams competing in the same market areas.

The game may be played with either two or three teams with three or four men on a team. Company organization may be left to the players or different forms of organization may be dictated by the umpires. An umpire for each group is required and in some instances a head umpire may be desired. Therefore if three teams are participating three or four companies would be needed.

The basic tools which are required are sets of random number tables, the game board, and the decision forms. The game board is divided up so that the left hand half of the game board represents the market and the right hand half the operations of the company. Each block in the left hand side represents either a rural or an urban customer. The blocks in the right hand side are used to build into the game the delay factors. For example in the training of a new salesman he can be moved up one square each quarter until he is fully trained and then may begin making calls on customers. Some sort of symbols are required to indicate salesmen, and other resources. These can be models or simply pieces of

paper.

The time periods of play represent one quarter of a year. The time allowed for decisions may be longer at first but after a few decisions are made should be shortened to about fifteen minutes. The players make their decisions, enter them on the decision sheets and give their decisions to the umpire. He then evaluates their decisions and returns these results to the players for another cycle to begin.

Before the game is started the players are given a briefing explaining the rules and the mechanics of game play. At this time the past history of the company can be provided to assist the teams in making their first decision. Normally all teams are started from the same base with $400,000 in capital.

A company's progress is judged by changes in its total assets, profits, sales volume, and share of the market. This information is plotted on large boards and a continuous record of each team's performance is kept for the critique which is held at the completion of the game.

The market is made up of 24 customers each of which has a different potential in any given time period. The market is dynamic since customer potentials change. The effects of a rising or falling economy can be built into the market. In order to make a sale the customer must be contacted by a salesman. Different types of information can be obtained from the umpire to assist the sales department in determining which customers to call on. The teams must pay for this information however. By use of the random number tables it can be determined whether a sale is made or perhaps whether a salesman resigns.

Advertising and research and development may also be purchased and

can have a definite effect on the saleability of the product. Their effect is reflected by increasing the probability of a sale in a particular area so that if a salesman calls on a customer in that area where the advertising has been directed his probability of making a sale is increased. The plant that each company must build costs $150,000 and can produce 5 units per quarter. After that the production can be increased 5 at a time at a cost of $30,000 per increase. It takes three quarters for the effects of the increase to be available since the construction time must be considered. A certain fixed and variable cost are associated with the fixed production rate of 5 units per quarter. As production is increased the fixed costs remain constant but the variable costs drop.

The financial management is of course important. The sale price remains fixed and when a sale is made the amount of the sale is placed in the accounts receivable column. It takes four quarters for the accounts receivable to move up the board and to be converted to cash. Accounts receivable may be factored at a cost of 20% of value.

The above discussion of the general operating characteristics of the Andlinger Game serves to point out that the games can be realistic even without a computer and that by skillful administration considerable advantage may be gained from playing the game.

APPENDIX D

A MECHANIZED GAME DISCUSSED[1]

A typical computerized management game is the Management Decision-Making Laboratory, a game designed by the International Business Machine Corporation and provided to users of its equipment. The game is similar to the first AMA game and has been widely used due to its simplicity and the general availability of IBM equipment. It is relatively easy to administer and provides a good aura of realism.

The game is comprised of a mathematical model of a business economy within which three companies, selling the same basic product, compete for their share of the market. The product is not specifically defined. The decisions which must be made are based on general business principles rather than on specific knowledge of a particular product. The ultimate goal of the game is to put the company in a good financial position, increase the assets, make a good return on the initial investment, and operate under effective long-range plans.

The participants, the model and the computer, working together, make up the laboratory session in management decision making. The participants are divided into three competitive teams and no exchange of information is allowed between them except through reports prepared by the computer.

At the beginning of each quarter each team makes the decisions for its firm. These are punched into cards which are then used as input to the data processing system programmed to process the decisions in accordance with the rules of the model. The computer then simulates the

[1]Information in this appendix is taken from International Business Machine Corporation General Information Manual E20-8098.

business activity of each firm and prepares reports showing the results of the activity during the quarter. This cycle is repeated as often as time permits.

The market is geographically divided into four areas and any firm may sell its product in any area. Area i is the home area of firm i. i = 1,2,3, and area 4 is an open area.

At the start of play each firm is given a report showing the economic condition of their company and the industry as of the end of the previous period. There are two kinds of reports--industry reports and confidential company reports. The industry report contains information of the type usually published by firms and is available to the entire industry. The confidential report contains the kind of internal documents that normally would be available to executives faced with the types of decisions required during the play of the game.

After studying the reports, each team makes a set of decisions. For each marketing area, it must decide upon the unit selling price and the amount of money to be spent on marketing. In addition to area decisions a set of plant decisions must be made. Each firm must decide how much money to spend on plant improvement, production, and research.

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